REMARKS

The 35 U.S.C. § 103 Rejection of Claims

Claims 1-17, 19, 21 and 22 have been rejected by the Examiner under 35 U.S.C. 103(a) as being unpatentable over Brown (US 5,480,330) in view of Blanchard (US 6,273,768) and Austin (US 3,601,989).

Brown (US 5,480,330) discloses and discusses only one method for driving the impellers, that is a set of meshed bevel gears #143, #125 and #135, this forces each of the impellers to be driven at the same speed. A single engine driving a vertical shaft connected to two concentric shafts via bevel gears is the only method disclosed or suggested (see Col 3 lines 49-53). A fixed bevel gear arrangement teaches away from one impeller being driven at a different speed to the other, no other method of driving the impellers is disclosed or suggested.

Brown makes no suggestion that one impeller imparts less energy to the water than the other; with the impellers speeds locked together by the bevel gears this is not even fairly suggested.

Amended Claim 1 is characterised in that it relates to a low pressure high mass water propulsion unit. Brown describes a unit with a convergent subsection 45 (nozzle), see Col 2 lines 12-29, a nozzle or convergent subsection is typical of a high pressure low mass device, where the thrust is developed in the nozzle section. To put this in perspective, a high pressure marine propulsion unit operates between about 0 and 150psi whereas a low pressure unit, such as that of the present invention, operates at between about 0 and 40psi. A high pressure unit ejects a low mass high velocity jet of water to develop its thrust, a low pressure unit ejects a high mass of water, a much lower velocity (often only slightly above the speed of the object being propelled). Any outlet that includes a nozzle will tend to make the propulsion unit act as a high pressure unit.

Therefore, in addition to the features missing from Brown, mentioned in paragraph 1 on page 3 of the Office Action dated 8/28/2007, we contend that Brown further lacks an outlet that offers minimal impedance to the flow of water therethrough. The convergent subsection (a nozzle) is required to allow the device described in Brown to generate the thrust by raising the pressure inside the unit. The nozzle cannot be said to offer minimal impedance to the flow of water therethrough; its intention is to increase the pressure and velocity of the water.

With due respect to the examiner, a marine propulsion unit with a nozzle cannot be said to be a low pressure high mass unit. The object of the nozzle is to raise the pressure to increase the velocity of the exiting jet of water and generate thrust. Therefore Brown, which includes/requires a nozzle, does not relate to a low pressure high mass marine propulsion unit which, following amendment of claim 1, is a characterising feature of the present invention.

We contend that Brown, either alone or in combination with any other document(s) does not disclose the present invention as claimed in any claim. Brown in fact teaches away from the present invention requiring as it does a convergent subsection in the discharge section which generates the thrust and thus relates to a high pressure low mass unit.

Blanchard (US 6,273,768) indicates in the Background section Col. 1 lines 15-22 that a water jet apparatus includes a water tunnel which includes a convergent nozzle and describes how this works. So with due respect to the examiner, although the nozzle #70 can be changed, thus allowing it to be varied in size, it is still a convergent nozzle and always present. As discussed in the background of the present application, Blanchard teaches that by impelling water towards the nozzle it produces force, reinforcing that Blanchard is a high pressure low mass device. Both Brown and Blanchard relate to high pressure low mass devices (they generate their thrust in the same way) that is they generate thrust by increasing the pressure inside the unit to create a high velocity low mass jet exiting the nozzle. As amended in claim 1, a characterising feature of the present invention is that it is a low pressure high mass unit which generates thrust by moving a large volume of water at lower velocities and

pressures. The outlet of the present invention provides minimal impedance to the water flow therethrough; this is not zero impedance as the interior of the water propulsion unit must be at slight positive pressure to prevent air entering the unit causing cavitation.

One may wish to combine Brown and Blanchard to develop an improved high pressure low mass marine propulsion unit. However, as they both require a nozzle, neither can operate as a low pressure high mass device, a characterising feature of the presently amended claims.

Brown does not describe a device with a downstream impeller in direct communication with the outlet, and the examiner agrees with this. Brown shows in Fig 1, and describes in Col. 3 lines 8 and 9, a plurality of angularly spaced vanes #103 after the downstream impeller and before the water outlet. There is no embodiment described where the vanes are not present; on lines 62-66 it teaches away from eliminating the vanes by indicating that the invention is directed to reduce or eliminate the drag occurring incident to water flow past the straightening vanes. The vanes are still present, though they appear to maintain the axial flow rather than act as the only flow straightening feature. Therefore, Brown does not have a downstream impeller in direct communication with the outlet; this teaches away from the present invention.

Blanchard similarly is directed to provide a water jet apparatus having means of decreasing the amount of energy lost due to flow straightening stator vanes (Col 1. lines 42-45); they are still present. Blanchard further states that "the impeller arrangement requires less severe curvature of the straightening vanes" (Col. 1 lines 53-56), so the invention described includes vanes #24 (in stator housing 22') is similar to Brown. Both Brown and Blanchard have vanes between the downstream impeller and the outlet, thus there is no direct communication of the downstream impeller to the outlet. Both Brown and Blanchard teach these vanes are necessary, whereas the present invention eliminates the need for them, both Brown and Blanchard teach away from a downstream impeller in direct communication with the outlet.

We contend that Brown either alone or in combination with Blanchard does not disclose the present invention as claimed in any claim. Brown in combination with Blanchard in fact teaches away from the present invention requiring as they do a convergent subsection in the discharge section which generates the thrust and thus relate to a high pressure low mass unit. Further, there is no mention or suggestion that one impeller imparts less energy than the other, nor that a downstream impeller is in direct communication with a minimal impedance outlet.

Austin (US 3,601,989) describes a single or multistage marine propulsion unit that is configured to drive one impeller with a diesel engine and a second impeller with a gas turbine. Austin does this so that at low speeds the diesel engine is used and at high speeds the gas turbine is used, this allows the propulsion unit to operate with improved performance, see Col 3 lines 15 to 45. This use of different engines to improve efficiency can be used as a single or multistage device, see Col 3 lines 71-73. Austin is intended to operate with one or both impellers being driven, there is no disclosure of either impeller being driven in the opposite direction to the other. Austin also teaches that either one prime mover can drive each impeller separately or a prime mover can drive both impellers. The present invention requires at least two driven impellers, with one impeller to be driven in the opposite direction to at least one other. The present invention could not achieve its objectives if only a single impeller was driven.

Austin includes a nozzle #22 which has a convergent section (unnumbered) downstream of the impeller (rotor) #26, see fig 1. This convergent section increases the pressure downstream of the impeller teaching away from an outlet with minimal impedance in direct communication with the downstream impeller; this in fact teaches towards a high pressure low mass device. Certainly this is reinforced with the statement in Col 4 lines 29-31 where it says "extremely high jet velocities may be achieved"; the present invention seeks low jet velocities but a high mass flow.

Austin does not describe a system with stators following the downstream impeller, thus there is no motivation to combine this with Brown or Blanchard, which are specifically directed to eliminating or at least reducing the losses in the stator section

between the downstream impeller and the outlet. To eliminate the losses in the stator section Brown and Blanchard introduce a second impeller rotating in the opposite direction to the first, the aim being to create as near axial flow below the downstream impeller as possible. Austin glosses over eliminating swirl as this is not possible without stators if a single impeller is present, and Austin allows and specifically describes a single driven impeller system (and stator blades #32 between the impellers).

To reiterate the point, to achieve their stated objectives neither Brown nor Blanchard can be operated with a single impeller, nor can they have all impellers driven in the same direction; they would not eliminate swirl in the water from the upstream impeller to reduce the losses in the stator section. Given Brown and Blanchard cannot operate in the manner described in Austin, and meet their objectives, it is difficult to see what motivation one skilled in the art would have to combine the teachings of Austin with Brown and/or Blanchard. Austin does not suggest that either impeller can rotate in the opposite direction and the only mention of eliminating swirl is a stator section 32 between the two impellers.

Austin alone does not disclose the present invention, and there does not appear to be any motivation for combining Austin with Brown and/or Blanchard. Austin in combination with any other document does not disclose the invention as claimed in any of the presently amended claims. Brown and Blanchard cannot meet their stated objectives without two impellers rotating in opposite directions and a stator/vanes after the downstream impeller. Austin is configured to operate with one impeller, or two impellers rotating the same direction, and no stator/vane between the downstream impeller and the nozzle (outlet).

Brown, Blanchard and Austin relate to high pressure low mass water propulsion units; they do not individually or combined disclose a low pressure high mass water propulsion device with the downstream impeller in direct communication with an outlet that offers minimal impedance to the flow therethrough. Therefore, even if there was any motivation for one skilled in the art to combine Austin with Brown and/or Blanchard, the device taught/disclosed would not include any of the characterising features of the present invention

ALLOWABLE SUBJECT MATTER

The Examiner states as follows: "Claims 18 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims."

It is respectfully submitted that base Claim 1, as amended, is allowable over the cited art. Accordingly, it is requested that the requirement that claims 18 and 20 be rewritten in independent form be withdrawn.

Favorable reconsideration and passage to allowance are respectfully solicited.

It is believed that no further fees or deficiencies in fees are owed. However, authorization is hereby given to charge our Deposit Account No. 13-0235 in the event any fees are owed.

Respectfully submitted,

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